

CHAPTER 1

NOMENCLATURE AND GLOSSARY

As in any technical or specialist field, many of the special words, phrases, terms, and symbols used in electronics are unfamiliar to the average person. To assist you in following the material presented in the ensuing chapters, this chapter is devoted to a description of equipment identification systems (nomenclature designations) and to a glossary of common electronic terms and symbols.

JOINT ELECTRONIC TYPE DESIGNATION SYSTEM

Electronic equipments and units are identified in the Joint Electronics Type Designation System (AN System) which is administered under the authority of the Armed Forces Supply Support Center.

The Electronic Type Designator System for electronic equipment is intended to:

1. Be logical in principle so that the nomenclature type numbers will be understood readily, and the operation of the armed services supply services will be facilitated.
2. Be flexible and sufficiently broad in scope to cover present types of equipment, as well as new types and uses of equipment that will be developed in the future.
3. Avoid conflict with nomenclature assigned at present to the equipment used by the Armed Services.
4. Furnish adequate identification on name plate with or without the name part of the nomenclature.
5. Provide a ready means of identifying equipment in correspondence and other types of communications.

The system is so designed that its indicators reveal at a glance many details that pertain to the item. For example, it tells

whether the item is a SET or a UNIT, and such other information as where it is used, what type equipment it is, and what it is used for.

AN nomenclature consists of an approved name followed by the type number. For a complete set, the type number will consist of three indicator letters and an assigned number.

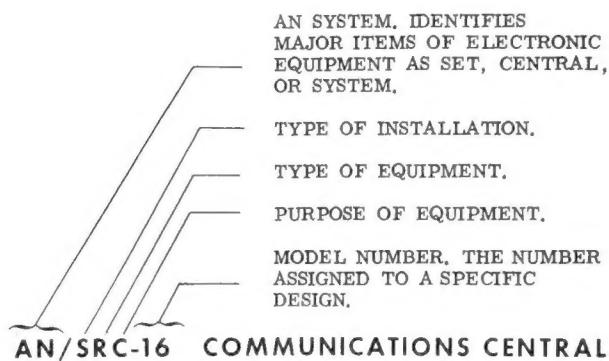
Using this system of identification, the installation type, the type of equipment, and the purpose of each equipment and unit can be readily determined. The derivation and meaning of the nomenclature for a representative equipment (Communications Central AN/SRC-16) is delineated in figure 1-1.

In the three letter group (fig. 1-1A and B) the first letter "S," designates the type of installation, i.e., "Water Surface (See table 1-1.)" The second letter "R" designates the type of equipment, in this case "Radio." The third letter "C" defines the purpose of the equipment as "Communications."

The number (type number) immediately following the three letter group identifies a particular equipment and includes all of its modifications as discussed below. The meaning of any three letter group can be similarly interpreted by referring to Table 1-1.

A modification letter is used to identify a set that has been modified, but which still retains the basic design and is functionally and electrically (power source is the same) interchangeable with the unmodified set (fig. 1-1A). When the AN/SRC-16 is modified, it becomes the AN/SRC-16A; the "A" indicates the first modification. The next modification would be the AN/SRC-16B, and so on.

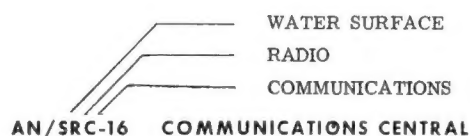
The parenthesis () as shown in figure 1-1A is used with the type number assignment to provide a broader identification than that provided by a type number alone. A series of sets or units may be identified by the use of one or more letters and/or numbers in the



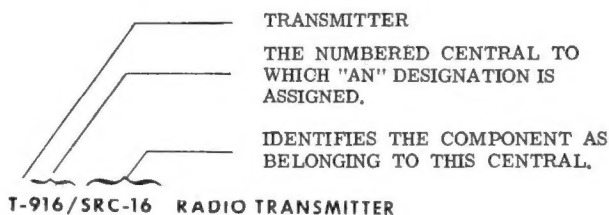
- 16A A MODIFIED VERSION OF THE EQUIPMENT.
- 16B THE NEXT MODIFICATION.
- 16 () A GENERAL IDENTIFICATION, INCLUDES THE EQUIPMENT AND ALL ITS MODIFICATIONS.
- 16 (XN-1) EXPERIMENTAL VERSION.
- 16 (V) VARIABLE GROUPING HAVING A VARIABLE PARTS LIST.
- 16 X CHANGE IN INPUT VOLTAGE, PHASE OR FREQUENCY.

T-916/SRC-16 A COMPONENT OF THE AN/SRC-16.

(A)



(B)



(C)

Figure 1-1.—Joint Electronic Type Designation System for nomenclature AN/SRC-16 Communications Central.

parenthesis after the identifying number. For example, the AN/SRC-16 (XN-1) designates an experimental or special model. If the same basic design of an equipment is kept, but the input power is changed from 110 volts to 100 volts, the letter "X" is added to the nomenclature so that it becomes the AN/SRC-16X. The second power input change would be identified by the letter "Y". The letter (V) within the parenthesis is used to identify systems with varying parts lists. It indicates that a set utilizes or can utilize a variable grouping or selection of units thereby making possible optional installations.

The letter (T) is used for training sets. It is used in conjunction with the other indicators to show that it is a training set for a specific equipment. Likewise, it may be used to indicate a trainer for a special family of equipment. For example, the first training set for the AN/SRC-16 would be the AN/SRC-16T1.

COMPONENT IDENTIFICATION

So far, consideration has been given only to the indicators used in set nomenclature. Now, let's examine the indicators for major components of a set.

Components are identified by means of indicating letters, which tell the type of component it is; a number, which identifies the particular component; and, finally, the designation of the equipment of which it is a part or with which it is used.

The transmitter for the AN/SRC-16 for example, would be identified as shown in (fig. 1-1C).

A modification letter identifies a component that has been modified but still retains the basic design and is interchangeable physically, electrically, and mechanically with the modified item. Thus, the T-916(A)/SRC-16 would be a modified version of the T-916/SRC-16.

Components that are part of or used with two or more sets are identified in the usual way, except that only those indicators that are appropriate and without a set model number appear after the slant bar.

RADIO OPERATING POSITIONS AND REMOTES

Table 1-2 shows the alphabet for radio operating positions and remotes.

Table 1-1.—Table of Equipment Indicator Letters.

| FIRST LETTER (DESIGNED INSTALLATION CLASSES) | SECOND LETTER (TYPE OF EQUIPMENT) | THIRD LETTER (PURPOSE) |
|---|---|--|
| A - Piloted aircraft | A - Invisible light, heat radiation | A - Auxiliary assemblies (not complete operating sets used with or part of two or more sets or sets series) |
| B - Underwater mobile, submarine | B - Pigeon (do not use) | B - Bombing |
| C - Air transportable (inactivated, do not use) | C - Carrier | C - Communications (receiving and transmitting) |
| D - Pilotless carrier | D - Radiac | D - Direction finder, reconnaissance, and/or surveillance |
| F - Fixed ground | E - Nupac | E - Ejection and/or release |
| G - General ground use | *F - Photographic | G - Fire-control, or searchlight directing |
| K - Amphibious | G - Telegraph or teletype | H - Recording and/or reproducing (graphic, meteorological and sound) |
| M - Ground, mobile | I - Interphone and public address | K - Computing |
| P - Portable | J - Electromechanical or Inertial wire covered | L - Searchlight control (inactivated, use G) |
| S - Water surface | K - Telemetering | M - Maintenance and/or test assemblies (including tools) |
| T - Ground, transportable | L - Countermeasures | N - Navigational aids (including altimeters, beacons, compasses, racons, depth, sounding, approach, and landing) |
| U - General utility | M - Meteorological | P - Reproducing (inactivated, use H) |
| V - Ground, vehicular | N - Sound in air | Q - Special, or combination of purposes |
| W - Water surface and underwater combination | P - Radar | R - Receiving, passive detecting |
| | Q - Sonar and underwater sound | S - Detecting and/or range and bearing, search |
| | R - Radio | T - Transmitting |
| | S - Special types, magnetic, etc., or combinations of types | W - Automatic flight or remote control |
| | T - Telephone (wire) | X - Identification and recognition |
| | V - Visual and visible light | |
| | W - Armament (peculiar to armament, not otherwise covered) | |
| | X - Facsimile or television | |
| | Y - Data processing | |

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Table 1-2.—Alphabet for Radio Operating Positions and Remotes.

| Radio | | Radio | |
|----------|--------------------|----------|--------------------|
| Alphabet | Position & Remotes | Alphabet | Position & Remotes |
| A | Audio | N | Channel |
| C | Control | O | Operating |
| D | Data | P | Position |
| E | Emergency | Q | Secure |
| F | Facsimile | R | Remote |
| G | Telegraph | S | Station |
| H | Radiophone | T | Teletype |
| J | Panel | U | Unit |
| L | Local | V | Supervisor |
| M | Monitor | X | Extension |

Examples of position designations are:

LOP: Local Operating Position
 LTP: Local Teletype Position
 RHS: Remote Radiophone Station
 RDP: Remote Data Position

GLOSSARY OF COMMON
ELECTRONIC TERMS

You doubtless are familiar with some of the terms listed in this glossary. It is not expected, however, that you will know all of the terms used with operational electronics. Accordingly, a study of these terms should contribute to a better understanding of the information contained in this text.

3-M: Maintenance and Material Management.
A planned maintenance system concept and application.

ACCELEROMETER: An inertial device. An instrument for sensing a change in velocity such as the increase in the speed of an object.

ADP: Automatic data processing: (See below)

AEW: Airborne early warning. A planned radar system between surface ship and aircraft for long-range detection and identification used near the periphery of a defended area.

AF: Audiofrequency. (See below)

AFTSRATT: Audiofrequency tone shift radioteletype. A radioteletype tone-modulated system similar to the familiar AM radio method of broadcasting. It replaces the term frequency shift keying.

ALIGN: To adjust the tuned circuits of a transmitter or receiver for proper signal response.

ALPHA PARTICLES: Positively charged particles (helium nucleus) having great ionizing power but very little penetrating power, and are dangerous to living tissue.

AM: Amplitude modulation: (See below)

AMBIENT NOISE: The overall noise energy from all environmental sources. In sonar it is the background noise inherent in the sea and collectively designated ambient noise.

AM COMPATABLE: Used in conjunction with SSB (single side band) where the amplitude modulated carrier wave and either the upper side band or the lower side band carries the intelligence.

AMMETER: An instrument for measuring the electron flow in amperes.

AMPERE: The basic unit of current flow; a current of 1 ampere will flow through a conductor having a resistance of 1 ohm when a potential of 1 volt is applied.

AMPLIFICATION: The process of increasing the strength (voltage, current, or power of a signal).

AMPLIFICATION FACTOR (μ): The ratio of a small change in plate voltage to a small change in grid voltage, with all other electrode voltage constant, required to produce the same small change in plate current.

AMPLIFIER: A device for increasing the signal voltage, current, or power without appreciably altering its quality; generally made up of an electron tube or transistor and an associated circuit called a stage. The amplifier may contain several stages in order to obtain a desired gain.

AMPLITUDE DISTORTION: The undesired change of a waveshape so that it no longer is proportional to its original form.

AMPLITUDE MODULATION: Changing the amplitude of a radiofrequency carrier wave in accordance with the variations of an audio-frequency wave.

ANALOG COMPUTER: A computer which solves problems by translating physical conditions such as flow, temperature, pressure, or voltage into electrical equivalent circuits and producing numbers as outputs.

ANODE: A positive electrode; the plate of a vacuum tube.

ANTENNA: Also aerial. A conductor or system of conductors that radiates or intercepts energy in the form of electromagnetic waves.

ANTENNA REFLECTOR: That portion of a directional antenna array which changes the direction of radiant energy behind the array and increases it in the forward direction.

ANTIJAMMING: A function of a radar set to reduce or eliminate enemy jamming of electromagnetic waves which are hindering the usefulness of specific segments of the radio spectrum.

ARRAY: Radio:-A combination of antenna elements arranged to reinforce the performance of the other and used where signal gain by direction is required. Computer:-A series of items arranged in a meaningful pattern.

ASW: Antisubmarine warfare.

ATTENUATION: The reduction in strength of a signal. The amount of attenuation is usually expressed in decibels.

AUDIO COMPONENT: That portion of any wave or signal whose frequencies are within the audio range.

AUDIOFREQUENCY: A frequency that can be detected as a sound by the human ear. The range of audiofrequencies extends from 20 to 20,000 hertz.

- AUTOMATIC DATA PROCESSING:** The processing of data automatically by means of a machine in which the internal interacting assemblies of procedures, processes, and methods perform a complex series of computer operations.
- AUTOMATIC DIRECTION FINDER:** An automatic radio compass which automatically aims a directional antenna to show the direction of location of a transmitter.
- AUTOMATIC GAIN CONTROL:** A method of automatically regulating the gain of a receiver so that the output tends to remain constant though the incoming signal may vary in strength.
- AZIMUTH:** An angle measured clockwise from true north. Azimuth and bearing are usually used synonymously. (See bearing)
- BALANCED CIRCUIT:** A divided circuit in which both sides are electrically equal.
- BAND:** The radio frequencies existing between two definite limits and used for a definite purpose. Example: Standard broadcast band extending from 550 to 1600 kHz.
- BANDPASS FILTER:** A circuit designed to pass currents of frequencies within a definite frequency band with nearly equal response, and to reduce substantially the amplitude of currents of all frequencies outside that band.
- BAND SPREAD:** Any method of spreading tuning over a greater range to facilitate tuning in a crowded band of frequencies.
- BANDWIDTH:** The total frequency width of a channel or band of frequencies.
- BATHYTHERMOGRAPH:** A recording thermometer for obtaining a permanent graphical record of water temperature in degrees fahrenheit at different water depths in feet as it is lowered or dropped into the ocean.
- BEACON:** Compared to a lighthouse. A radio or radar signal station which provides navigation and interrogation information for ships and aircraft.
- BEARING:** The angular position of an object with respect to a reference point or line. If the reference point is true north, the bearing is the true bearing; if the reference is NOT true north, the bearing is a relative bearing. (See azimuth)
- BEAT FREQUENCY:** One of the two additional frequencies obtained when signals of two different frequencies are combined. Their values are equal to the sum and difference, respectively, of the original frequencies.
- BEAT FREQUENCY OSCILLATOR:** An oscillator in which an audible beat frequency is obtained by mixing or beating together two radiofrequencies. The BFO is used for continuous wave (CW) reception in superheterodyne receivers, or as an instrument for test purposes.
- BEAT NOTE:** The audiofrequency produced by beating together two different frequencies.
- BETA PARTICLES:** High speed electrons that will travel several feet in air and are dangerous to living tissue.
- BIAS:** The DC voltage or current applied to a circuit to establish the desired electrical operating point.
- BIASING RESISTOR:** A resistor used to provide the voltage drop for a required bias.
- BILLBOARD or BEDSPRING ARRAY:** A broadside radar antenna array consisting of stacked dipoles in front of a large flat sheet-metal untuned reflector.
- BIT:** Binary digit: A single electrical pulse, a character, or unit of information used as the basic intelligence in a binary system.
- BLEEDER:** A resistance connected in parallel with a power-supply output to protect equipment from excessive voltages if the load is removed or substantially reduced; to improve the voltage regulation, and to drain the charge remaining in the filter capacitors when the unit is turned off.
- BOTTOM BOUNCE:** That form of sonar sound transmission in which sound rays strike the ocean bottom in deep water at steep angles and are reflected back to the surface and returned, which allows the obtaining of target information at long distances.
- BREAKDOWN VOLTAGE:** The voltage at which an insulator or dielectric ruptures; or the voltage at which ionization and conduction begin in a gas or vapor tube.
- BT:** Bathymograph (see above).
- BUFFER:** Isolated circuitry inserted between two noncompatible circuits to make them compatible with each other. Also a storage device used to allow for differences in rates of data flow when transmitting information from one computer device to another.
- BYPASS CAPACITOR:** A capacitor used to provide an alternating current path of comparatively low impedance around a circuit element.
- CAPACITOR:** Two electrodes or sets of electrodes in the form of plates, separated from each other by an insulating material called

- the dielectric. The capacitor has the property of storing electrical energy in an electrostatic field between the electrode plates.
- CARRIER:** The frequency of an unmodulated RF transmitted wave. The RF component of a transmitted wave upon which an audio signal or other form of intelligence can be impressed.
- CATHODE FOLLOWER:** A vacuum-tube circuit in which the input signal is applied between the control grid and ground, and the output is taken from the cathode and ground. A cathode follower has a high input impedance and a low output impedance.
- CCA:** Carrier control approach. Provides a radar system for guiding aircraft to safe deck landings during night flying or under conditions approaching zero visibility.
- CCM:** Counter countermeasures. Measures taken to reduce the effect of enemy jamming on our own electronic equipment.
- CATHODE:** The electrode in a vacuum tube that provides electron emission.
- CAVITATION:** The separation between the ship's propeller blades and the surrounding water caused by the propeller turning so rapidly that the water does not have time to close in behind the blades thus producing a stream of bubbles. The abrupt collapse of the bubbles causes the acoustic signal known as cavitation. Sonar can often determine the class of ships by their cavitation.
- CHANNEL:** A narrow band of frequencies including the assigned carrier frequency, within which a radio or TV station is required to keep its signals within.
- CHONOMETER:** A time piece with a nearly constant rate having extremely great accuracy.
- CLOSED CIRCUIT TELEVISION:** The application of television where reception is confined locally and not for broadcasting. The receivers are connected to the television camera by coaxial cables. The system is used chiefly aboard ship for pilot's landing aid television (PLAT) system and crew entertainment.
- COAXIAL CABLE:** A transmission line consisting of one conductor, usually a small copper tube or wire, within and insulated from another conductor of larger diameter, usually copper tubing braid. The outer conductor may or may not be grounded. Radiation from this type of line is practically zero. Coaxial cable sometimes is called concentric line.
- CODE:** A system of dots and dashes for transmission of messages.
- CONDUCTANCE:** The ability of a material to conduct or carry an electric current. It is the reciprocal (opposite) of the resistance of the material and is expressed in mhos.
- CONTINUOUS WAVES:** Radio waves that maintain a constant amplitude and a constant frequency.
- CONVERGENCE ZONE:** That region in the deep ocean where sound transmissions directed downward refract from the depths and arrive at the surface in successive intervals of 30 to 35 miles. This sound channel can permit ships to detect targets at long distances.
- CONVERSION:** A term applied to the section(s) of a superheterodyne receiver that converts the desired incoming RF signals to desired IF values to lower the frequency. This may be accomplished in ONE, TWO, or THREE stages known as SINGLE, DOUBLE, or TRIPLE conversion (sometimes referred to as stages in DETECTION, or HETERODYNING).
- COUNTERMEASURES:** (see ECM)
- COUNTERPOISE:** A conductor or system of conductors used as a substitute for ground in an antenna system.
- CROSS MODULATION:** A type of crosstalk in which the modulated carrier frequency being received is interfered with by an adjacent modulated carrier, so that the modulated signals of both are heard at the same time.
- CROSSTALK:** Refers to an unwanted signal which may appear on one channel due to the recording on the adjacent channel, or to an undesired coupling with another communication channel.
- CRT:** Cathode-ray tube. An electron-beam tube in which the beam can be focused to a small cross section on a phosphorescent screen and varied in position and intensity to produce a visible pattern.
- CRYPTOGRAPH:** The art of writing in secret code. Rendering a plain text unintelligible to those who are not informed of the code.
- CRYSTAL:** A natural substance as quartz or tourmaline capable of producing a voltage when under stress or pressure, or producing pressure when under an applied voltage. Under stress, it has the property of

- responding only to a given frequency when cut to a given thickness. It is therefore valuable for transmitters or oscillators whose frequencies range between 500 kHz and 10 MHz.
- CRYSTAL CONTROL:** Control of the frequency of an oscillator by means of a specially designed and cut crystal.
- CRYSTAL OSCILLATOR:** An oscillator circuit in which a crystal is used to control the frequency and to reduce frequency instability to a minimum.
- CURIE:** The basic unit to describe the intensity of radioactivity in a sample of material.
- CURRENT:** The flow of free electrons, expressed in amperes.
- CURSOR:** A clear or amber-colored filter placed over an electronic marker, available on a radar or control indicator screen and manipulated to determine accurately the bearing of a target.
- CW:** Continuous wave (see above).
- CYCLE:** One complete positive alteration and one complete negative alteration of an alternating current or voltage.
- DASH:** Drome Antisubmarine helicopter. An unmanned remote-controlled helicopter used in dangerous areas for spotting targets with TV camera and other detection devices. The helicopter is capable of carrying two ASW torpedoes.
- DB:** Decibels. The unit for measuring the relative loudness of sounds. The unit is a value that expresses the comparison of sounds of two different levels.
- DEAD RECKONING ANALYZER:** The dead reckoning analyzer receives the ship's speed in knots from the pit log, and the ship's course input from the master gyro. These two inputs are combined to determine and indicate the total distance traveled and also the overall distances in a north-south and east-west direction traveled by the ship from any starting point.
- DEMODULATION:** The process of extracting the intelligence from the RF carrier, with which the carrier has been modulated.
- DETECTOR CIRCUIT:** The portion of a receiver that recovers the audible signal from the modulated RF carrier wave.
- DEVIATION:** A term used in frequency modulation to indicate the amount (of frequency) by which the carrier or resting frequency increases or decreases when modulated. It usually is expressed in kilohertz.
- DEVIATION RATIO:** A term used in frequency modulation to indicate the ratio of the maximum amount of deviation of a fully modulated carrier to the highest audiofrequency being transmitted.
- DIELECTRIC:** An insulator. A term applied to the insulating material between the plates of a capacitor.
- DIGITAL COMPUTER:** A type of calculating machine that operates with numbers expressed directly as digits, generally using binary or decimal notation to solve extremely complex and involved mathematical problems.
- DIGITAL DATA TRANSMISSIONS:** The RF transmission of data from a computer in serial or parallel format of binary numbers. The radiofrequency transmission is usually by a series of pulse code modulations.
- DIODE:** A two-electrode vacuum tube containing a cathode and a plate.
- DIPOLE ANTENNA:** A center-fed one-half wave antenna.
- DISTORTION:** Distortion is said to exist when an output waveform is not a true reproduction of the input waveform. Distortion may consist of irregularities in amplitude, frequency, or phase.
- DOPPLER EFFECT:** The change in frequency of sound, radio, or light waves reaching an observer, due to the difference in relative motion of the source or observer, or both. It is the change in a received frequency because of relative motion between transmitter and receiver.
- DOSIMETER:** A device that measures radiation dosage.
- DRIVER:** An amplifier used to excite the final power amplifier stage of a transmitter or receiver.
- DUPLEXER:** An electronic switching device which makes possible the use of one antenna for both transmitting and receiving.
- EAM:** Electrical accounting machine. The set of conventional punchcard equipment including sorters, collators, and tabulators.
- ECM:** Electronic countermasures. Active-use of transmitting equipment that may jam the enemy transmissions. Passive-use of receiver equipment to intercept enemy radar or radio transmissions.
- EDP:** Electronic data processing. Processing performed largely by equipment using electronic circuitry for storing and manipulating data. It is the interacting assembly of

- methods, procedures, and electronic equipment.
- EFFICIENCY:** The ratio of output to input power, generally expressed as percentage.
- ELECTRIC FIELD:** A region in space in which electrified bodies are subjected to forces acting upon them by virtue of their electrification.
- ELECTRODE:** A terminal at which electricity passes from one medium into another.
- ELECTROLYTE:** A water solution of a substance which is capable of conducting electricity. An electrolyte may be in the form of either a liquid or a paste.
- ELECTROMAGNETIC WAVE:** A wave of electromagnetic radiation, characterized by variations of electric and magnetic fields.
- ELECTRON:** The most elementary charge of electricity. It is always negative.
- ELECTRON EMISSION:** The liberation of electrons from a body into space under the influence of heat, light, impact, chemical disintegration, or a potential difference.
- ELECTROSTATIC FIELD:** The field of influence between two charged bodies.
- ELECTROSTRICTION:** That property of certain ceramic materials which after having a permanent operating bias established causes these materials to vary slightly in length when they are placed in an electric field.
- EMF:** Electromotive force. An electrical force that produces an electrical current in a closed circuit. Has the same meaning as voltage, potential difference, electrical pressure.
- EMO:** Electronic material officer.
- EXCITER:** (see transmitter).
- FACSIMILE:** Transmitting photographs, drawings, handwriting, or printed matter over an electronic communications system.
- FADING:** Variations in the strength of a radio signal at the point of reception.
- FAIL SAFE:** A control so designed that a control circuit malfunction cannot cause a dangerous condition under any circumstance.
- FARAD:** The unit of capacitance.
- FATHOMETER:** An instrument aboard ship for determining depth of water by measuring the time that it takes the generated sound emissions to reach bottom and return as an echo.
- FEEDBACK:** A transfer of energy from the output circuit of a device back to its input.
- FIDELITY:** The degree of accuracy with which a system, or portion of a system, reproduces in its output the signal impressed on its input.
- FIELD:** The space containing electric or magnetic lines of force.
- FILTER:** A combination of resistances, inductances, and capacitances, or any one or two of these, which allows the comparatively free flow of certain frequencies or of direct current while blocking the passage of other frequencies. An example is the filter used in a power supply, which allows the direct current to pass, but filters out the AC component.
- FIX:** A determination of navigational position usually the intersection of several lines-of-position or bearing lines.
- FLIP FLOP:** A bistable multivibrator. Frequently used in computer applications as counters.
- FM:** Frequency modulated (see below).
- FREE ELECTRONS:** Electrons that are not bound to a particular atom, but move about continuously among the many atoms of a substance.
- FREQUENCY:** The number of hertz (cycles per second) of an alternating current.
- FREQUENCY DIVERSITY:** A method by which two or more transmitters will transmit simultaneously at two or more distinct frequency bands, and the reception is a single signal selected from a plurality of signals. This method reduces the effects of fading. It gives a greater effective range and reduces the susceptibility to jamming.
- FREQUENCY DIVISION MULTIPLEXING:** A process for the transmission of two or more channels over a common path by using a different frequency band for each channel. (See MULTIPLEXING.)
- FREQUENCY DOUBLER:** An electronic circuit in which the output is tuned to twice the frequency of the input.
- FREQUENCY DRIFT:** Change in a frequency from its basic wavelength caused by temperature or component variations in the frequency-determining elements.
- FREQUENCY METER:** A meter calibrated to measure frequency.
- FREQUENCY MODULATION:** The process of varying the frequency of an RF carrier wave in accordance with the frequency of an audio signal. The amplitude of the modulated wave stays essentially constant.

- FREQUENCY MULTIPLIER:** A frequency device used to multiply an original frequency by an integral value.
- FREQUENCY STABILITY:** The ability of an oscillator to maintain its operation at a constant frequency.
- FREQUENCY STANDARD:** A stable low frequency oscillator used for frequency calibrations. It usually generates a fundamental frequency of 50 to 100 kilohertz with a high degree of accuracy and the harmonics of this fundamental are used to provide reference points for checking (50 or 100 kilohertz apart) throughout the radio spectrum.
- FULL-WAVE RECTIFIER CIRCUIT:** A circuit which utilizes both the positive and the negative alterations of an alternating current to produce a direct current.
- GAIN:** The ratio of the output power, voltage, or current to the input power, voltage, or current.
- GAMMA RADIATION:** High energy short-wave length electromagnetic radiation with tremendous penetrating power, and is dangerous to living tissue.
- GCA:** Ground control approach. A talk-down method for landing an aircraft.
- GHz:** Giga hertz. Having a value of 1 billion hertz.
- GIGA:** A prefix indicating the value of one billion (1,000,000,000).
- GRAZING ANGLE:** The angle that the sound ray path forms with the reflecting surface; usually applies to sound rays reflected from the ocean bottom.
- GROUND:** A metallic connection with the earth to establish a common connecting point. Also, a common return to a point of zero potential.
- GROUND PLANE ANTENNA:** A vertical radio antenna combined with a turnstile element to lower the angle of radiation, and having a concentric base support and center conductor that together serve to place the antenna at ground potential even though it may be located several wavelengths above ground.
- GROUNDWAVE:** That portion of the transmitted radio wave that travels near the surface of the earth.
- HAND KEY:** A switch used in communications to provide a mode of operation in which transmission is usually coded.
- HARMONIC:** An integral multiple of a fundamental frequency. (The second harmonic is twice the frequency of the fundamental or first harmonic.)
- HEMISPHERICAL SCAN:** Scanning one of two equal parts of a sphere. Essentially a radio or radar scan of horizon-to-90 degree overhead, through 360° azimuth radiation pattern or sonar scan of horizon-to-90° ocean bottom, through 360° azimuth radiation pattern.
- HENRY:** The basic unit of inductance.
- HERTZ:** A new term used for frequency measurement replacing the old term cycles per second.
- HETERODYNE:** To mix two alternating currents of different frequencies in the same circuit; they are alternately additive and subtractive, thus producing two beat frequencies, which are the sum of and difference between the two original frequencies.
- HIGH FIDELITY:** The ability to reproduce all audio frequencies between 50 and 16,000 hertz without serious distortion.
- HIGH-LEVEL MODULATION:** Modulation produced at a point in a system where the power level approximates that at the output of the system. Also called plate modulation.
- HYDROPHONE:** An acoustic device that receives and converts underwater sound energy into electrical energy.
- HYPERBOLA:** In a flat plane, is the locus of a point which moves so that the difference between the distances from two fixed points (called the foci) is constant.
- HYPERBOLOID OF REVOLUTION:** The surface traced by a hyperbola rotating about one of its axes.
- Hz:** Hertz. Replaces the old abbreviation cps.
- ICW:** Interrupted continuous wave. Used for morse code transmission.
- IF:** Intermediate frequency. (see below).
- IFF:** Identification friend or foe. A challenge and an automatic response system developed for use with radar equipment. A coded challenging transmission, when received by a friendly craft will automatically transmit a coded identification signal.
- IMPEDANCE:** The total opposition to current flow in an AC circuit.
- IMPULSE:** Any force acting over a comparatively short period of time. An example would be a momentary rise in voltage.
- INERTIAL NAVIGATION:** Dead reckoning performed automatically by a device which gives a continuous indication of position by combining vectors for speed, direction, and other factors since leaving a starting point.

IN PHASE: Applied to the condition that exists when two waves of the same frequency pass through their maximum and minimum values like polarity at the same instant.

INPUT-OUTPUT EQUIPMENT: A device which provides the means of communication between the computer and external equipment. The device accepts new data, sends it into the computer for processing, receives the results, and transforms the data into usable form.

INSTANTANEOUS VALUE: The magnitude at any particular instant when a value is continually varying with respect to time.

INTELLIGENCE: The message or information conveyed, as by a modulated radio wave.

INTENSITY: The relative strength of electric, magnetic, or vibrational energy.

INTERFACE: A concept involving the specification of the interconnection between two equipments or systems. The specifications include the type, quantity, and function of signals to be interchanged via those circuits.

INTERMEDIATE FREQUENCY: The fixed frequency to which all RF carrier waves are converted in a superheterodyne receiver.

INTERNATIONAL MORSE CODE: The universal code used for radio telegraphy. It differs from the American Morse Code used for wire telegraphy, in the spacing and letter codes.

ISB: Independent sidebands (two) (see **SIDE-BANDS**).

ISOTHERM: Having no temperature changes in water from surface to varying depths.

ION: An atom that has lost or gained one or more electrons and is therefore positively or negatively charged.

IONIZATION: The breaking up of atoms into ions.

IONOSPHERE: Highly ionized layers of atmosphere from between 40 and 350 miles above the surface of the earth.

KHz: Kilohertz. Having a value of one thousand (1,000 or 10^3) hertz.

KILO: A prefix meaning one thousand.

KLYSTRON TUBES: A velocity-modulated thermionic tube for microwave operation.

LEAKAGE: The electrical loss due to poor insulation.

LINEAR: The relationship of two related quantities such that a change in one will result in the exact proportional change in the other. A system in which the output varies in direct proportion to the input.

LOCAL-REMOTE CONTROL: A switch usually mounted on an instrument control panel of a unit and permits the operation of the system locally (near the panel) or remot (at some distant place).

LOF: Line of fire. A straight line joining missile or gun and point of impact (or burst) of the missile or projectile.

LONG RANGE: A radio distance of over 1,500 miles.

LOOP ANTENNA: One or more complete turns of wire used with a radio receiver. Also used with direction-finding equipment.

LORAN: Long range navigation. An electronic navigational system with high frequency receivers and scope indicators in which mathematical hyperbolic lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals.

LOS: Line of sight. The straight-line distance from ship to horizon. Represents radio and radar VHF and UHF transmission range limits under normal conditions.

LOUDSPEAKER: A device that converts AF electrical energy to sound energy.

LOW-LEVEL MODULATION: Modulation produced at a point in a system where the power level is low compared with the power level at the output of the system.

LSB: Lower sideband. (See **SIDEBANDS**).

MAGNETIC FIELD: The region in space which a magnetic force exists, caused by a permanent magnetic, or as a result of current flowing in a conductor.

MAGNETIC HEAD: A transducer in a tape recorder which converts the electrical signals into magnetic fields for establishing the magnetic pattern on the tape.

MAGNETOSTRICTION: That property of certain ferro type materials which causes them to vary slightly in length when they are in an alternating magnetic field.

MAGNETRON: A special microwave oscillator tube which produces an AC output for radio and radar high power transmitters.

MARK AND SPACE: Pertaining to telegraph communications in which the marking intervals are the intervals which correspond to one condition or position of transmission, usually a closed condition. Spacings are the intervals which correspond to another condition of the transmission, usually an open condition.

- MATCHED IMPEDANCE:** The condition which exists when two coupled circuits are so adjusted that their impedances are equal.
- MCW:** Modulated continuous wave. A form of transmission in which the carrier wave is modulated by a constant AF tone.
- MEG OR MEGA:** A prefix indicating one million.
- MHO:** The unit of conductance.
- MHz:** Megahertz. Having a value of 1,000,000 or 10^6 hertz.
- MICROPHONE:** A device for converting sound energy into AF electrical energy.
- MICROSECOND:** Abbreviated (μ sec). A time measurement having a value of one millionth (.000001 or 10^{-6}) of a second.
- MILLISECOND:** Abbreviated (m sec). A time measurement having a value of one thousandth (.001 or 10^{-3}) of a second.
- MTI:** Moving target indicator. A radar system providing improved target discrimination against clutter from sea or shore return. Detects moving targets in the presence of obscuring echos which otherwise would be obscured.
- MK:** MARK. A designation followed by a serial number to identify equipment of a particular military design (usually ordnance). This MARK number is further extended by a MOD number(s) when equipment of this design has been modified.
- MODULATED CARRIER:** An RF carrier whose amplitude or frequency has been varied in accordance with the intelligence to be conveyed.
- MODULATION:** The process of varying the amplitude or the frequency of a carrier signal (RF output of the transmitter) at the rate of an audio signal. The modulating signal may be an audiofrequency signal, video signal (as in television), or even electrical pulses or tones.
- MODULATOR:** That part of a transmitter that supplies the modulating signal to the modulated circuit, where it can act upon the carrier wave.
- MODULE:** A technique of compact packaging electronic circuitry and components of an individual subsystem to be used in combination with other packaged subsystems to form a complete electronic system. This is a great aid in diagnostic maintenance of the equipment.
- MULTICOUPLER:** An antenna permitting simultaneous operation of several transmitters and/or receivers from the same antenna.
- MULTIPLEXING:** A system to increase the message-handling capacity of RF channels by simultaneous transmission of two or more signals using a common carrier wave.
- NAUTICAL MILE:** Equals 6,080 feet. An electromagnetic signal will travel a nautical mile in 6.18 microseconds.
- NETWORK:** Any electrical circuit containing two or more interconnected elements.
- NIXIE TUBE:** A radio tube capable of forming the ten different numerals (zero through nine) for digital readouts.
- NTDS:** Naval tactical data system. An automatic data processing system for combat ships within a fleet task force. The network is basically ship and airborne data links in communications and weapons systems.
- OFF-LINE EQUIPMENT:** Peripheral computer equipment which can operate independently of the main computer for such operations as transcribing punchcard information to magnetic tape, or magnetic tape to printed form.
- OHM:** The unit of electrical resistance.
- OHM'S LAW:** A fundamental law of electricity. It expresses the definite relationship existing between the voltage E, the current I, and the resistance R, the common form for which is $E = IR$.
- OMNIDIRECTIONAL:** Going out in all directions as the radiation pattern of a single dipole antenna.
- ON-LINE EQUIPMENT:** Main computer equipment, due to configuration or design, that requires the use of the central processing unit of the computer.
- OPEN CIRCUIT:** A circuit which does not provide a complete path for the flow of current.
- OSCILLATOR:** A generator of radiofrequency waves.
- OSCILLOSCOPE:** An instrument for showing visually on a cathode ray tube representations of the waveforms encountered in electrical circuits.
- OUTPUT:** The energy delivered by a device or circuit such as a radio receiver or transmitter.
- OVERLOAD:** A load greater than the rated load of an electrical device.
- OVERMODULATION:** More than 100 percent modulation. In amplitude modulation, over modulation produces positive peaks of more

than twice the carrier's original amplitude, and brings about complete stoppage of the carrier on negative peaks, thus causing distortion.

PA: Power amplifier. The last stage of RF amplification in a transmitter or other appropriate equipment.

PARABOLIC REFLECTOR: A dish reflector whose section is a parabola and capable of reflecting waves in parallel when a radiated wave source is placed at its focus.

PASSIVE: Involves the natural radiation or reflection of energy given off by an object. Passive electronic equipments are designed for detection of objects.

PATCH CORDS: A cord equipped with plugs at each end for receiving jacks and used to connect transmitter and receiver transfer panels to remote control points located throughout the ship.

PATCH PANEL: A board where circuits are terminated in jacks for temporary connections to electric cords for communications.

PEAK VALUE: The maximum instantaneous value of a varying current, voltage, or power. It is equal to 1.414 times the effective value of a sine wave.

PERCENTAGE OF MODULATION: A measure of the degree of change in a carrier wave caused by the modulating signal, expressed as a percentage.

PERIPHERAL EQUIPMENT: Either on-line or off-line auxiliary equipment supporting the operations but is not a part of the computer itself. These machines may consist of card readers, cardpunches, magnetic tape feeds, and high speed printers.

PHASE DIFFERENCE: The time in electrical degrees by which one wave leads or lags another.

PIEZOELECTRIC EFFECT: Effect of producing a voltage by placing a stress, either by compression, expansion, or twisting, on a crystal and, conversely, producing a stress in a crystal by applying a voltage to it.

PIPS: Popular term for bright spots on a CRT display such as a radar or sonar screen.

PLATE: The principal electrode in a tube to which the electron stream is attracted. See Anode.

POTENTIOMETER: A variable voltage divider. A resistor that has a variable contact arm so that any portion of the potential applied between its ends may be obtained.

POWER: The rate of doing work or the rate of expending energy. The unit of electrical power is the watt.

POWER TUBE: A vacuum tube designed to handle a greater amount of power than an ordinary voltage-amplifying tube.

PPI: Planned position indicator. A type of radar or sonar scope display in which a sweep rotates radially across the screen to indicate position of targets simultaneously through 360 degrees.

PRECESSION: Change in the direction of the axis-of-rotation of a spinning body as a gyroscope, when acted upon by a torque.

PRINTED CIRCUIT BOARD: An insulating board method of connecting electrical circuits on a plane surface with conductive and resistive materials.

PROGRAM: A complete plan for the solution of a problem, including the complete sequence of machine instructions and routines necessary to solve the problem by an electronic computer.

PULSATING CURRENT: A direct current which periodically increases and decreases in value.

PULSE: A momentary sharp surge of electrical voltage or current.

PULSE-DOPPLER: Combines the best features of continuous wave and pulse radar. The pulse-doppler method is used principally to obtain information about a target by its high frequency continuous waves in the form of short burst or pulses.

PULSE DURATION: The time interval between the points on the leading and trailing edges at which the instantaneous values bears a specific relation to the peak pulse amplitude.

PULSE INTERVAL: The time interval between the leading edges of successive pulses in a sequence characterized by uniform spacing.

PULSE LENGTH: Same as Pulse Duration.

PULSE MODULATION: The forming of very short bursts of a carrier wave separated by relatively long periods during which no carrier wave is transmitted.

PULSE REPETITION RATE: The rate at which the recurring pulses are transmitted, usually expressed in pulses per second.

PULSE SEPARATION: The time interval between the trailing edge of one pulse and the leading edge of the next pulse.

PULSE SPACING: Same as PULSE INTERVAL.

PULSE TRAIN: A group of related pulses, constituting a series.

- PULSE WIDTH:** Same as PULSE DURATION.
- RAD:** An unit of absorbed dosage of nuclear radiation.
- RADAR:** Radio detection and ranging. A radio echo device for detecting and tracking ships and aircraft and other material targets.
- RADIO:** The science of communication in which radiofrequency waves are used to carry intelligence through space. A general term denoting radio waves transmission and reception, exclusive of specialized systems such as facsimile of television, and radar which employ radio principles but are commonly known by other terms.
- RADIOACTIVITY:** The emission by the unstable nucleus of particles or by electromagnetic waves as alpha, beta, or gamma radiation.
- RADIO CHANNEL:** A band of adjacent frequencies of a width sufficient to permit its use for radio communication.
- RADIO DIRECTION FINDER:** A receiver and a rotatable loop antenna used principally to locate personnel afloat on life rafts and life boats equipped with radio transmitters.
- RADIOFACSIMILE:** The transmission of still images (weather maps, photographs, sketches, typewritten pages, etc.) over a radiofrequency channel.
- RADIOFREQUENCY:** Any frequency of electrical energy capable of radiating great distances into space. Basically, these frequencies occupy the frequency spectrum between audio sound and infrared light.
- RADIOSONDE:** An instrument carried aloft by an unmanned balloon and equipped with elements for determining temperature, pressure, and relative humidity at regular intervals during the ascent by automatically transmitting the measurements back to earth by radio for recording. A parachute lowers the equipment earthward when the balloon bursts.
- RADIOTELEPHONY:** Two-way voice communications conducted by means of radiofrequency waves.
- RADIOTELETYPE:** The transmission of messages from a teletypewriter or coded tape over a radiofrequency channel by means of coded combinations of mark and space impulses.
- RADIO CHANNEL:** A band of adjacent frequencies of a width sufficient to permit radio communication. Channel width depends on the type of transmission and the tolerance for the frequency of emission.
- RADIO WAVES:** The electromagnetic radiations caused by oscillation of electric charges capable of traveling through space at the speed of light.
- RCVR:** An abbreviation for receiver.
- RDT:** Rotating directional transmission. Equipment used in radar and sonar to concentrate the total power into a directional transmission beam that covers a narrow sector as it rotates 360 degrees in azimuth.
- REAL TIME:** Computer operation with regard to the time interval between the inquiry for information and the delivery of information to and from the computer (virtually zero time).
- REFLECTION:** The turning back of a radio wave from the surface of the earth or the ionosphere.
- REFRACTION:** The bending or change in the direction of a wave in passing from one medium into another. This effect will turn a radio wave back to earth if the angle of attack is not too great, and it will bend a sound wave in sonar ranging as the wave passes from one layer of water to another.
- RELATIVE BEARING:** A bearing taken when the heading of a ship serves as the reference line.
- REPEATERS:** Radar or sonar indicators.
- REPERFORATOR:** A machine that automatically punches or perforates tape to record the message being sent or received by the radio teletype machine. May be used to perforate tapes for original outgoing messages or for taping incoming messages for later retransmission.
- RESONANCE:** The condition existing in a circuit when the values of inductance, capacitance, and the applied frequency are such that the inductive reactance and capacitive reactance cancel each other.
- RESTING FREQUENCY:** The initial frequency of the carrier wave of an FM transmitter before modulation. Also called the center frequency.
- REVERBERATION:** A succession of echos caused by reflections of sounds. In the ocean it is caused by irregularities in the ocean bottom, surface, and suspended matter (as fish). Under these conditions an emitted pulse may be received as a muffed echo due to sound interference.

RFCSRATT: Radio frequency carrier shift radioteletype. A radioteletype frequency shift system similar to the familiar FM radio method of broadcasting. It replaces the term frequency shift keying.

RHEOSTAT: A variable resistor, usually associated with power devices.

RHI: Range-height indicators. Indicators used as radar repeater equipments for height-finding radar systems.

ROENTGEN: A unit of exposure dosage of nuclear radiation.

ROUTINE: A set of coded instructions arranged in proper sequence to direct the computer to perform a desired operation or sequence of operations.

SAM: Surface-to-air missile.

SCD: Ship's center display. A sonar CRT presentation display where the electron beam begins an expanding spiral sweep at the center of the indicator tube.

SELECTIVITY: The relative ability of a receiver to select a particular frequency and to reject all others.

SENSITIVITY: The relative ability of a receiver to amplify small signal voltages.

SHIELDING: A metallic covering used to prevent magnetic or electrostatic coupling between adjacent circuits.

SHORAN: Short range navigation. A very accurate short range navigational aid used to determine position. Ship or aircraft radar signals automatically trigger off two fixed transmitters ashore for range comparison and determination.

SHORT WAVE: Refers to radio operation on frequencies higher than those used at the present time for commercial broadcasting. The range of frequencies extend from 1500 kilohertz to 30,000 kilohertz.

SHUNT: Parallel. A parallel resistor placed in an ammeter to increase its range.

SIDEBAND POWER: The power contained in the sidebands. It is to this power that a receiver responds, not to the carrier power, when receiving a modulated wave.

SIDEBANDS: Two bands of frequencies, one above and one below the carrier frequency, produced as a result of modulation of a carrier. The upper sideband contains the frequencies that are the sums of the carrier and modulated frequencies. The lower sideband contains the difference of these frequencies.

SIF: Selective identification feature. Makes the system of identifying friendly units

much more secure and more positive. An added improvement to the MARK X IFF system.

SILENT TUNING: A method of switching a low power continuous wave signal into a dummy load for tuning and silencing a possible radiating transmitter antenna against detection during a period of silence. The system is kept continuously tuned for maximum output at all times.

SINS: Ships inertial navigation system. A navigational aid first developed for submarines. This dead reckoning system is a self-contained guidance system which operates on an arrangement of three gyros and two accelerometers that automatically follow a preset course. Aircraft and missiles also use an inertial guidance system.

SKIP DISTANCE: The distance on the earth's surface between the points where a radio skywave is reflected successively between the earth and the ionosphere.

SKYWAVE: A radio wave which travels upward into the sky from a transmitter antenna and is, for the most part, bent back to earth by the ionosphere.

SOFTWARE: Pertains to the programs and routines used with computers. The totality of programs and routines used to extend the capabilities of computers. In contrast to **HARDWARE** which is the construction (mechanical, electrical, and electronic elements) of the computer.

SOLENOID: A multiturn coil of wire wound in a uniform layer or layers on a hollow cylindrical form.

SOLID STATE: The electronic components that convey or control electrons within solid materials.

SONAR: Sound navigation and ranging. Electronic equipment used for underwater detection of objects and range of these objects, also to determine the ocean profile and depths.

SPECTRUM: Arrangement of electromagnetic radiation energy wavelengths from the longest to the shortest radio waves.

STATIC: Any electrical disturbance caused by atmospheric conditions. Also a fixed, nonvarying condition, without motion.

SUBTRACK: The path traced on the earth by a satellite passing directly overhead.

SUPERHETERODYNE: A radio receiver which converts the carrier wave into a fixed

- intermediate lower radio frequency which is then highly amplified.
- SURFACE WAVE:** A radio wave which travels along the surface of the earth, bending with the earth's curvature.
- SYNCHRONOUS:** Happening at the same time; having the same period and phase.
- TACAN:** Tactical communication air navigation. An electronic polar coordinate system that enables an aircraft pilot to read continuously, the distance and bearing of a radio beacon transmitter onboard ship or on ground.
- TCD:** Target center display. A spiral sweep display in which the point of origin is moved, usually off the CRT tube, until a given target echo appears at the exact center of display.
- THERMOCLINE:** The layer in the sea where the temperature decreases continuously with depth. Usually the decrease (gradient) is greater than 2.7 degrees Fahrenheit per 165 feet in depth.
- THYRATRON:** A hot-cathode, gas-discharge tube in which one or more electrodes are used to control electrostatically the starting of an unidirectional flow of current.
- TONE CONTROL:** A method of emphasizing either low or high tones at will in an AF amplifier.
- TONE MODULATION:** A type of code-signal transmission obtained by causing the RF carrier amplitude to vary at a fixed audio-frequency.
- TRANSCIVER:** Combination of radio transmitting and receiving equipment employing common circuit components in a common housing for portable or mobile use.
- TRANSDUCER:** A general term for any device that converts energy from one form to another, always retaining the characteristic amplitude variations of the energy being converted.
- TRANSFORMER:** A device composed of two or more coils, linked by magnetic lines of force, used to transfer energy from one circuit to another.
- TRANSMISSIONS:** Passage of radio waves in the space between transmitter and receiving station.
- TRANSMITTER:** A comprehensive term applied to all of the equipment used for generating and amplifying an RF carrier signal, modulating this carrier with intelligence, amplifying and feeding the modulated RF carrier to the antenna for transmission into space.
- TRANSPONDER:** An acoustic device that can be activated upon receipt of a sound or radio signal.
- TRUE BEARING:** A bearing given in relation to true geographic north which is a point on earth about which one end of the earth revolves on its axis. The axis of earth aligns with the north star. (It is not the earth's magnetic pole.)
- TUNED CIRCUIT:** A resonant circuit.
- TUNING:** The process of adjusting a radio circuit to resonance with the desired frequency.
- UHF:** Ultra high frequency. The spectrum range between 300 million hertz to 3000 million hertz.
- ULTRASONICS:** The field of science devoted to frequencies of sound above the human audio range, i.e., above 20 kHz.
- UNIDIRECTIONAL:** Flowing in one direction only. (Direct current is unidirectional.)
- UT:** Universal time. Greenwich mean time. The mean solar time from the meridian of Greenwich from which geographers and navigators count their longitude. It is adopted as the prime basis for standard time throughout the world.
- USB:** Upper sideband communications. (see **SIDEBANDS**).
- VAC:** Volts, AC. Abbreviation for alternating current voltage.
- VACUUM-TUBE VOLTMETER (VTVM):** A device which uses either the amplifier characteristic or the rectifier characteristic of a vacuum tube or both to measure either DC or AC voltages. Its input impedance is very high, and the current used to actuate the meter movement is not taken from the circuit being measured. It can be used to obtain accurate measurements in sensitive circuits.
- VDS:** Variable depth sonar. Equipment developed to minimize the thermal layers in the ocean by lowering the transducer to optimum depths when searching for targets.
- VELOCITY:** A rate of change of distance with respect to time in a given direction.
- VHF:** Very high frequency. The spectrum range from 30 million hertz to 300 million hertz.
- VOLTAGE AMPLIFICATION:** The process of amplifying a signal to produce a gain in voltage. The voltage gain of an amplifier is the ratio of its alternating-voltage output to its alternating-voltage input.

- VOLUME:** A term used to denote the sound intensity (amount of radio output) of a receiver or audio amplifier.
- VOLUME CONTROL:** A device for controlling the output volume.
- WATT:** The basic unit of electrical power.
- WAVE:** The progressive movement (propagation) either of sound or electromagnetic waves through a conducting medium, as rhythmical disturbances.
- WAVEGUIDE:** A hollow rectangular or round pipe (plumbing) used as a transmission line to guide electromagnetic waves.
- WAVELENGTH:** The distance in meters traveled by a wave during the time interval of one complete cycle. It is equal to the velocity divided by the frequency.
- WAVE PROPAGATION:** The radiation, as from an antenna, of RF energy into space, or of sound energy into a conducting medium.
- WCS:** Weapons control system. A group of interconnected and interrelated equipments that are used to control the delivery of effective gun and missile firing on selected targets.
- WORD, COMPUTER:** An ordered set of characters which occupies one storage location and is treated by the computer circuits as a unit and transferred as such. Ordinarily a word is treated by the control unit as an instruction, and by the arithmetic unit as a quantity. Word lengths may be fixed or variable depending on the particular computer.
- XBT:** Expendable bathythermograph. A non-reusable thermometer type instrument dropped into the ocean for measuring water temperature at different levels, and the associated shipboard equipment used for launching and recording the data automatically.
- XMTR:** Abbreviation for transmitter.
- X RAY:** Penetrating electromagnetic radiation. Non-nuclear in origin.